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THE L'VOV-SANDOMIR OPERATION
July 13 - August 29, 1944

MARCH 1989

PREPARED BY
DR. ALLAN S. REHM
DISTINGUISHED VISITING ANALYST
1988/89
OFFICE, SPECIAL ASSISTANT FOR MODEL VALIDATION

US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814-2797

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Director
US Army Concepts Analysis Agency
ATTN: CSCA-MV
8120 Woodmont Avenue
Bethesda, MD 20814-2797

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The L'vov-Sandomir operation was a breakthrough against prepared defenses by the Soviet First Ukrainian Front against German forces which began on July 13, 1944. The report examines the Soviet initial planning for the operation, the force ratios achieved, and the results of the early portion of the attack. It shows the Soviet massing of forces at four levels of command for this operation, and the difficulties encountered even when force ratios initially exceeding 5:1 were met with a determined defense in depth. The report includes Soviet quantitative data about the operation for comparison with CAA's Benchmark program.

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RESEARCH PAPER
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THE L'VOV-SANDOMIR OPERATION
JULY 13 - AUGUST 29, 1944

I. S. Konev

K. V. Kraynyukov

V. D. Sokolovskiy

March 1989

Prepared by

Dr. Allan S. Rehm

Distinguished Visiting Analyst, 1988/89
Office of the Special Assistant for Model Validation

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814-2797

PREFACE

This report was done as a part of CAA's Distinguished Visiting Analyst program. CAA has been supporting several studies of historical theater combat data. The Benchmark Study established a data base for comparing model outputs with historical combat experience. That study contained limited examples from Soviet historical combat experience. Questions arose as to the availability of Soviet quantitative data suitable for Benchmarks, and whether or not Soviet experience was sufficiently different from that of the rest of the data base to justify the effort it would take to collect it. Dr. Rehm undertook this study in order to show the extensive Soviet data openly available on their operations and also that in at least a few cases (for example, massing of artillery), the Soviet experience would be classed as statistical outliers in the Benchmark data gathered to date.

The results of this short exploratory study were briefed to CAA in February 1989. The study is also an example of Soviet front-level command and control in a major war. Because of this, the results were briefed to conferences on Soviet troop control at Fort Leavenworth and at the Warrior Preparation Center, Einseidlerhof, Federal Republic of Germany. This report therefore has three purposes:

- To demonstrate that the Soviet quantitative data available for historical combat operations is extensive.
- To provide a concrete example of Soviet troop control and operational art which involved extensive massing of troops at multiple organization levels.
- To provide an example of an operational situation which would today call for the Soviet staff to do planning calculations using an automated troop control system.

The example in the report concerns one Soviet World War II front-level operation conducted in the summer of 1944 by the 1st Ukranian Front against the German Army Group, North Ukraine.

This document was prepared as part of an internal CAA project.

CAA	THE L'VOV-SANDOMIR OPERATION JULY 13 - AUGUST 29, 1944	STUDY SUMMARY CAA-RP-89-2

THE REASON FOR PERFORMING THE STUDY was to determine the feasibility of obtaining Soviet data for the Benchmark program.

THE STUDY SPONSOR was the Director, US Army Concepts Analysis Agency.

THE STUDY OBJECTIVES were to:

(1) Demonstrate that the Soviet quantitative data available for historical combat operations are extensive.

(2) Provide a concrete example of Soviet troop control and operational art which involved extensive massing of troops at multiple organization levels.

(3) Provide an example of an operational situation which would today call for the Soviet staff to do planning calculations using an automated troop control system.

THE SCOPE OF THE STUDY was limited to whatever could be found in about a calendar month and roughly 2 weeks of effort. The literature search was limited to sources onhand.

THE MAIN ASSUMPTION on which the study is based is that Soviet historical combat data have been collected competently and are honestly reported in Soviet open source literature.

THE PRINCIPAL LIMITATIONS which may affect further research are:

(1) Incomplete Soviet casualty and equipment loss data.

(2) The available casualty data are not always clear as to what definitions are used.

(3) Limited data on logistic support have been identified thus far.

(4) Data are available mainly about initial strengths and almost nothing on intermediate values, much less final strengths.

(5) Arrival time and extent of reinforcements are not always clear.

THE PRINCIPAL FINDING of the work reported was that, other than combat casualty data which are limited, Soviet data are comparable in extent to US data, it may be easier to extract (the Soviets having done most of the work), and quantitative historical data appear to be used consistently in Soviet sources over many years.

THE STUDY EFFORT was done by Dr. Allan S. Rehm, Distinguished Visiting Analyst.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-MV, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.

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JULY 13-AUGUST 29, 1944

Dr. Allan S. Rehm
Distinguished Visiting Analyst
US Army Concepts Analysis Agency

INTRODUCTION

This report concerns a Soviet World War II Front-level operation conducted in the summer of 1944 by the 1st Ukrainian Front against the German Army Group North Ukraine.

This report has three purposes:

- To demonstrate how much Soviet quantitative data are available on historical combat operations.
- To demonstrate a concrete example of Soviet troop control and operational art involving extensive massing of troops at multiple organization levels.
- To provide an example of a Soviet operation which today would call for the Soviet staff to do planning calculations on their automated troop control system.

Why the L'vov-Sandomir Operation? The L'vov-Sandomir operation was chosen for this example because there was Russian data available about the operation at the front, army, corps, and division levels in one breakthrough sector of the 60th Army. While there were data gaps, few Soviet operations have been reported in this level of detail at as many command levels.

The L'vov-Sandomir Operation has unique features. German Army Groups were larger than Soviet fronts. Soviet operations against German Army Groups therefore usually involved multiple Soviet fronts. L'vov-Sandomir is a rare example of a single Soviet front attacking an entire German Army Group.

BACKGROUND OF THE OPERATION

At the time of the L'vov-Sandomir Operation there were 11 Soviet fronts. Starting in the North there was a Karelian Front opposing the Finnish Army. Against the German, Hungarian, and other Axis armies there were a Leningrad Front, the Third, Second and First Baltic Fronts, the Third, Second, and First Belorussian Fronts, and the First, Second, and Third Ukrainian Fronts. This study is of the First Ukrainian Front's attack on the German Army Group North Ukraine with a principal focus on the first few days of the advance toward L'vov. The operation continued to achieve a bridgehead on the Sandomir village side of the Vistula River.

At about the same time to the north, the larger and better known Soviet multifront "Operation Bagration," which annihilated the German Army Group Center, was being conducted by the Belorussian Fronts and involved around 145 Soviet divisions, whereas the L'vov operation involved only 74 combined armed divisions and armored forces which brought the total to roughly 85 division equivalents. The map in Figure 1 is taken from a Soviet history of World War II. The 440-kilometer length zone of the First Ukrainian Front has been marked to emphasize it. The total 4,450-kilometer Soviet front against the Germans includes two more Fronts to the north of the map and two to the south of it.

Figure 2, taken from a World War I book on strategy and military topography, shows the area of the L'vov-Sandomir Operation and the terrain which influenced the campaign. The First Ukrainian Front's zone of responsibility extended from the Carpathian Mountains in the south up to a flat plains region along the Styr River. There were several rivers to cross in the southern portion of the zone, and one long ridge running from L'vov to Rava-Russka and northwest. Generally, the country was favorable for tank operations.

Some sources refer to L'vov under another of its names, Lemberg. L'vov had been part of Poland between the World Wars until it was incorporated into the Ukraine when Russia had divided up Poland with Germany. The German advance through the USSR had brought the city under German control. The Soviets claim that 700,000 civilians had been killed by the Nazis in the L'vov region, and they were anxious to regain the territory.

One of the three major operational concepts the Soviets introduced in the 1930s was that of successive operations, the idea that there should be as little pause as possible between major operations so as to prevent the enemy from having time to prepare defenses. That goal is probably now possible, but in 1944, the Soviet fronts normally took months to prepare an operation. The First Ukrainian Front had conducted the Ukrainian Right Bank Operation from 24 December 1943 to 17 April 1944. From April through July, the front did not change much, and the Soviets prepared for the upcoming operation to reach L'vov.

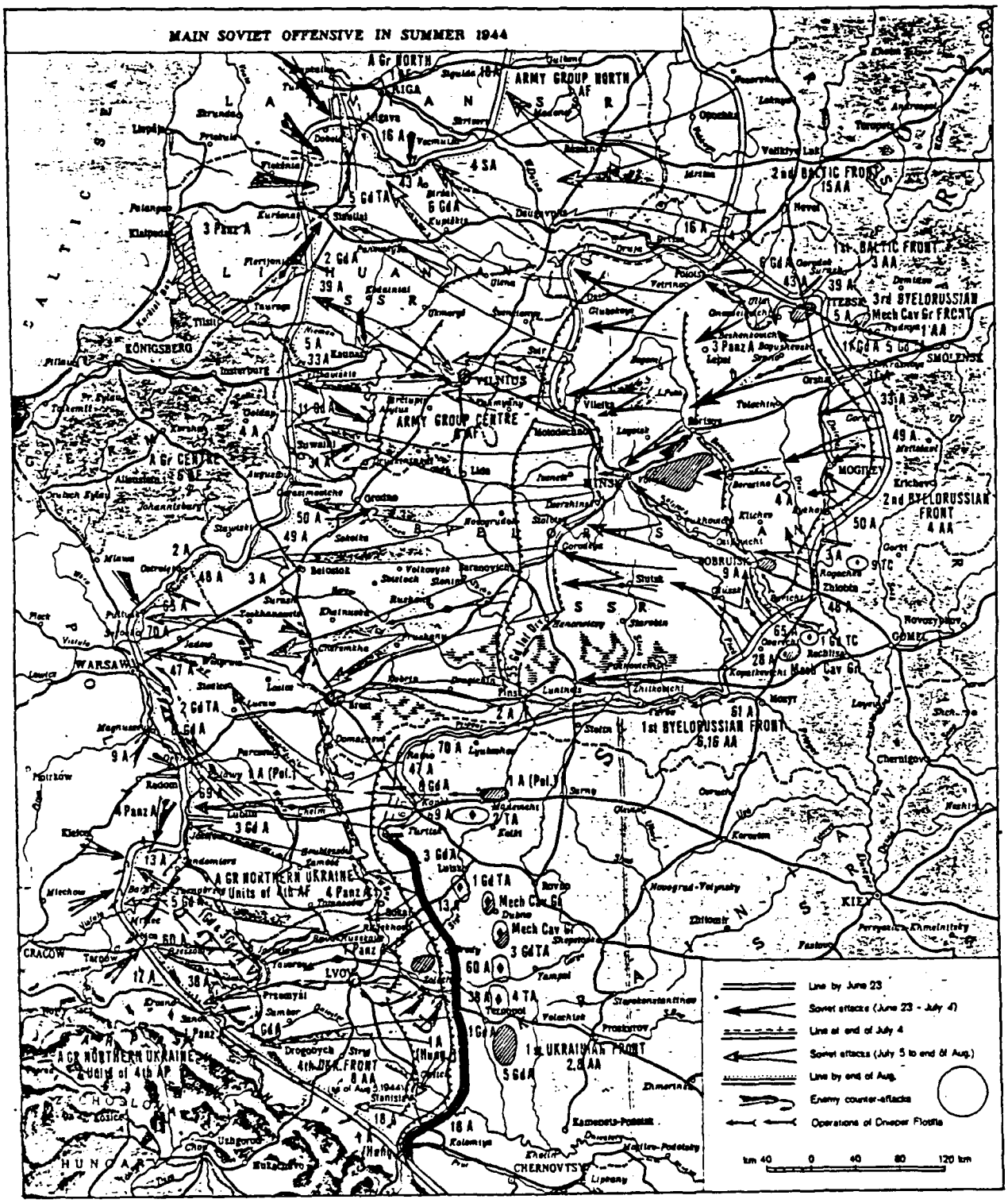

Figure 1. Soviet Offensive in Summer 1944

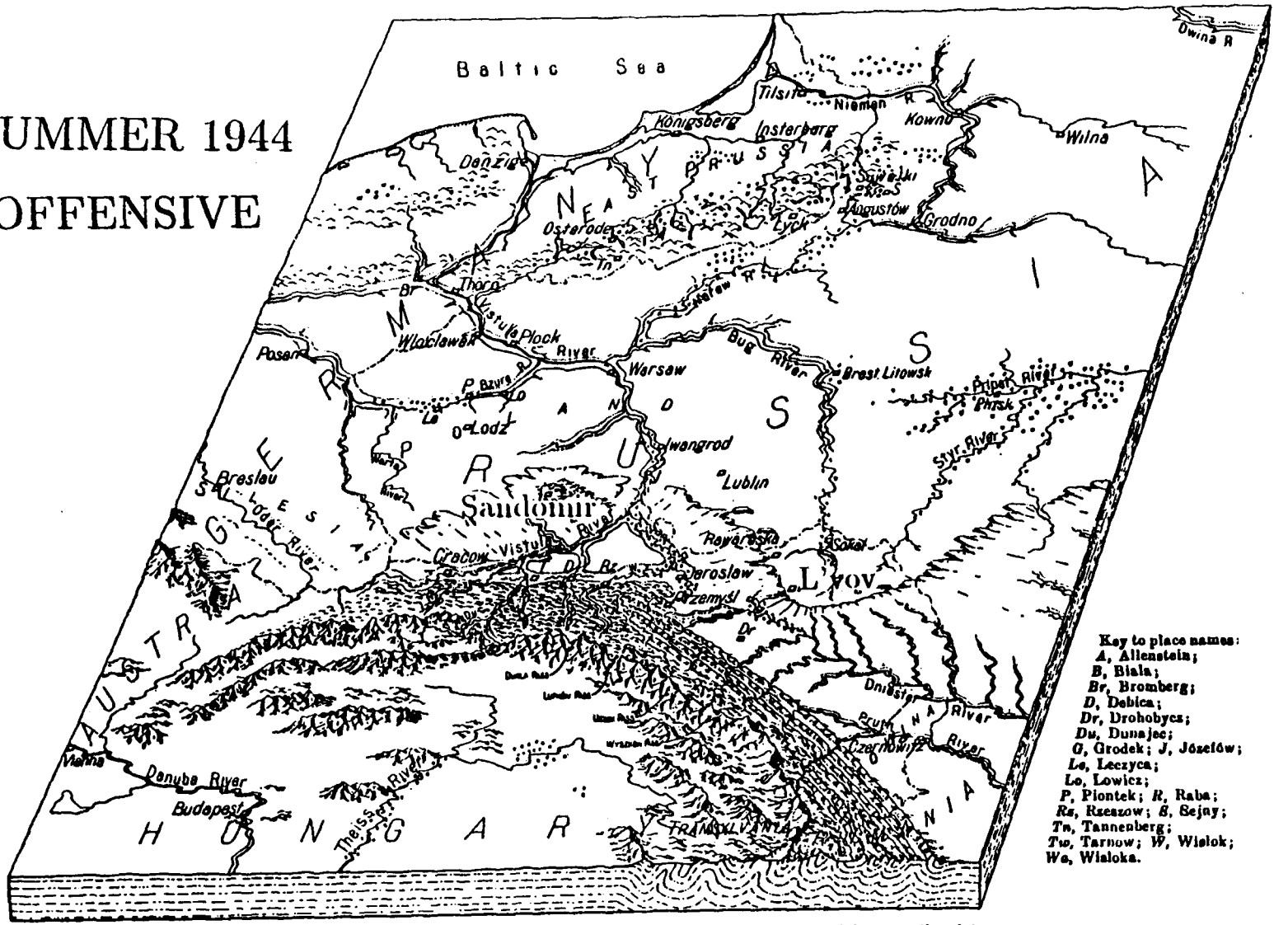

Figure 6. Diagrammatic view of the eastern theater of war, showing the Carpathian Mountains and their chief passes, the plain of Poland, the hill and lake country of East Prussia, the river trenches and marshes, and other features of the terrain which have influenced military operations in the east.

Figure 2. Area of Operations, Summer 1944 Offensive

SOVIET STAFF PLANNING

In reviewing this operation one might want to keep in mind the Soviet staff work it required, and how computers today might be used to maintain the necessary data base, perform calculations, assist in preparing orders, and generally decrease the time for staff work. One purpose of this study is to emphasize the place of combat calculations in Soviet planning of operations.

Table 1 shows typical planning times for Soviet operations during different periods of the war. The L'vov-Sandomir Operation took place during the Third Period. Figure 3 (Troop Control, Planning Combat Operations) is taken from a recent Soviet book, Troop Control in the Offensive. The planning times in the figure are for the Vistula-Oder Operation a few months later, but the text states the following:

> "The task was carried out in approximately the same manner in preparing the L'vov-Sandomir Operation (July 1944), when the army commanders gave the tasks to corps commanders 11 days before the start of the operation and the latter gave the missions to the division (brigade) commanders 5 days before the start. Such an allocation of time was made chiefly for achieving concealment of the operation." (Page 28 of the English translation by JPRS.)

Table 1. Planning Time in Days

War period	Single and multifront	Combined arms army	Tank army	Rifle division
First	2-7	1-15	1-4	3-24 Hours
Second	2-3 Months	4-10	1-2 up to 11	3-24 Hours
Third	3.5 Months	to 20	1-2 up to 8-10+	3-24 Hours

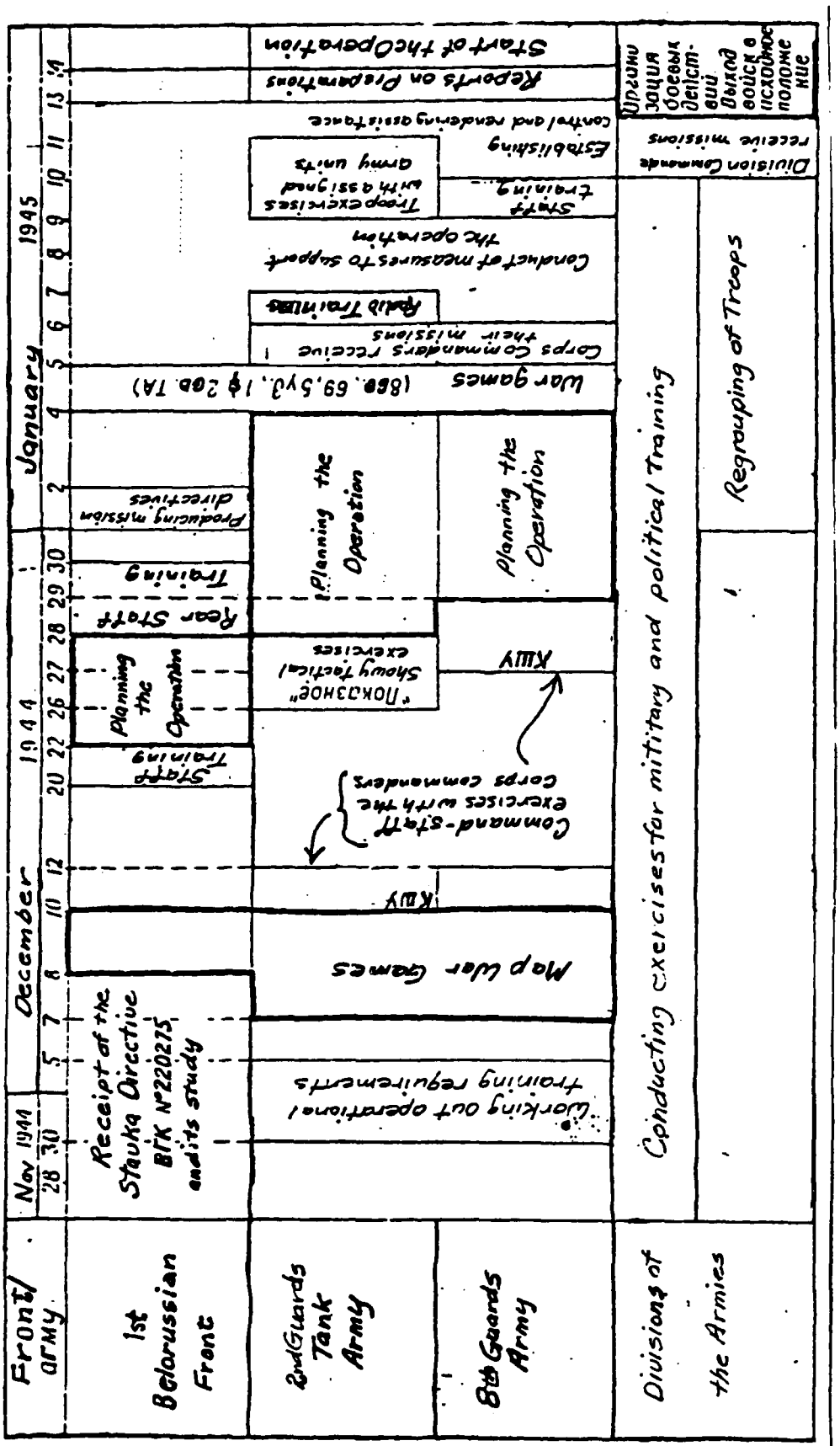

Figure 3. Troop Control - Planning Combat Operations

Throughout the war, there was an almost fanatical Soviet concern with secrecy and the possibility of enemy detection of when and where breakthrough operations would be conducted.

Note in Figure 3 the extensive time given to wargaming and command staff exercises during the preparation period. Also, the regrouping of troops began while the Army staffs were still engaged in planning the operation.

Table 2 lists some of the Soviet engineer support which was conducted during the planning period. Few people seem to realize the extent of Soviet combat engineer participation in preparing to conduct major offensive operations. Breakthrough zones of fronts usually contained 5-6 companies of engineers per kilometer of breakthrough zone, and as high as 17 per kilometer, in addition to the many regiments of infantry, and hundreds of artillery pieces. Rapid continuous advances required engineers to repair roads and bridges, remove obstacles and mines, bridge rivers, and to mine flanks against enemy counteractions. Engineers were and still are a key offensive asset in Soviet planning.

Table 2. Engineer Preparations, 1 May to 10 June 1944[a]

Type of support	Amount
Road repair	3,000 kilometers
Bridge repair	360; 5,300 meters
Largest bridges	30 to 60 tons
Trenches dug	2,241 kilometers
Commo wire laid	679 kilometers
Machinegun position	22,000
Machinegun pill boxes	1,426
Artillery positions	5,776
Mortar positions	5,600
Command and observation posts	5,497

[a]Source: [2, page 242].

Table 3 (Soviet Staff TO&E, 1945) shows the manning for Soviet division, corps, army, and front level staffs. The enlisted support and the small number of staff personnel should be noted. Chiefs of branches, such as artillery, also had staffs, but in general, Soviet staff structure tended toward the lean side. A Soviet division TO&E would have been about 9,400 personnel including command and staff. Infantry corps contained three divisions, but mechanized, cavalry, and tank corps consisting of brigades, had only about 12,000-15,000 personnel in their TO&E. By 1944, few units seem to have had full complements of troops and equipment.

Table 3. Soviet Staff TO&E, 1945

Organizational Element	Division	Corps	Army	Front
Command(er)	1	1	6	7
Chief of Staff	1/0	1/0		
Operations Directorate				69
Operations Section	3/1	6/4	26	
Intelligence Section	3/0	5/0	15	87
Section of Combat and Physical Training			6	11
Topographic Section	1/0		4	14
Personnel	3/1	4/6		
Section of Orgn-Registration and Manning			16	39
Administration and Supply	2/0	1/0		
Military Communications	2/0	3/1		
Cipher Clerks			16	33
Special	3/0	4/0		
Liaison		4/0		
Housekeeping Section			6	55
Financial Unit			2	3
Commandant's Office			1	4
Clerical			5	11
Total personnel	Cdr+18/2	Cdr+28/11	104	333
Civilians included	0	0	11	45
Number of Sections	8	8	11	11

Notation indicates *officers/enlisted men.* Sources: For Division and Corps, General-Major Popel', Colonels Savel'yev and Shemanskiy, *Troop Control in World War II*, 1974. For Army and Front, Colonel A. Bazhenov *Military Historical Journal*, March 1981, page 23.

Table 4 shows the desired Soviet correlations of forces and means for attack during different periods of the war, and the desired tactical densities of artillery, tanks, and infantry battalions. These tactical densities are weapons per kilometer of front in a breakthrough zone.

Table 4. Correlations of Forces and Means[a]

Correlation	Period of the war		
	First	Second	Third
Artillery	1.5-2:1	4-6:1	6-10:1
Tanks	0.6-1.5:1	2-3:1	4-5:1
Infantry	1.5-2:1	3-4:1	3-5:1
Density of forces and means per kilometer of front			
Artillery (guns and mortars)	20-40	120-200	200-250
Tanks (units)	8-15	15-20	20-30
Infantry (rifle battalions)	1.5-2	3-4	5-7

[a]Source: *Taktika* [Tactics], 1984, page 95.

Appendix B gives specifics on correlations of forces counting rules. Appendix C provides an explanation of correlation of forces and means, as translated from the Soviet Military Encyclopedia in 1976. In particular, it is highly dependent on reliable estimates of opposing force strengths. In most cases, the Soviets probably had good estimates, but sources cited do not qualify data as either historical evidence or estimates.

Figure 4 (Correlations of Forces and Means, Soviets and Germans) shows the overall Soviet-German theater correlation of forces from June 1941 to January 1945. The data is taken from a fascinating study by Mark Harrison [1985] of Soviet planning during World War II. Soviet correlations of forces and means normally count mortars of 76mm and larger caliber as artillery (today the lower limit is 100mm), and self-propelled guns are grouped with the tanks.

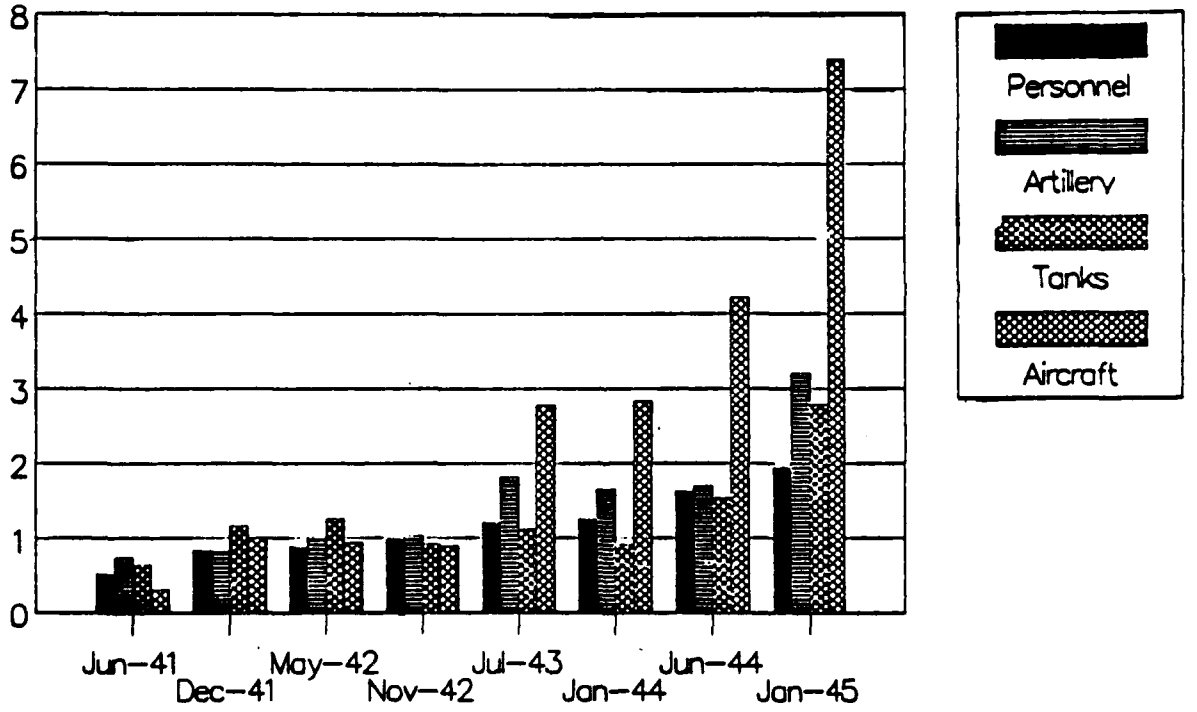

Figure 4. Correlations of Forces and Means, Soviets and Germans

Regarding the correlation of forces, the initial Soviet disadvantages in 1941 were redressed by November 1942. As Soviet industry was moved east of the Urals and began to produce, Soviet forces outstripped the Germans in every category, particularly aircraft. The Germans failed to attack Soviet industry early in the war, and by the time they decided to attack industries, the Germans discovered that Soviet industrial plants were out of range of the medium range bomber force the Germans had built.

Table 5 shows the major correlations of forces and means in the Eastern Theater of the war covering some 4,450 km frontage. They are far below the desired ratios for attack, except for aircraft.

Table 5. Eastern Theater Correlation of Forces[a]

Category	Soviets	Germans	Correlation
Total personnel[b]	6,500,000	4,000,000	1.6:1
Artillery and mortars	83,200	49,000	1.7:1
Tanks and SP guns	8,000	5,200	1.5:1
Aircraft	11,800	2,800	4.2:1

[a]Source: *Great Patriotic War of the Soviet Union 1941-1945. A General Outline,* Moscow: Progress Publishers, 1974, p 257.

[b]Includes rear service personnel.

THE FIRST UKRAINIAN FRONT

Turning to the First Ukrainian Front let us briefly examine the personalities on the Soviet side. The Front commander, Marshal Konev had replaced Marshal Zhukov for this operation. After Zhuko, Konev may be the next best known Soviet WWII commander. Konev had two members in his Military Council at the start of the operation. One was K. V. Kraynyukov, later to become an editor of the General Staff journal Military Thought. The other political officer was transferred on August 1, 1944 during the operation. He was General-Lieutenant Nikita Khrushchev, later head of the Communist party. The Chief of Staff was General (later Marshal and Chief of the General Staff) V. D. Sokolovskiy, the head of the authors' collective which produced the best known postwar book on military strategy first published in 1962.

At the start of the war, fronts usually had three armies, armies had three infantry corps, infantry corps were composed of three divisions, and so forth. By this time in the war competent commanders were given control over much larger forces, and only tactical organizations from division on down had fixed TO&Es. The First Ukrainian Front had seven combined arms armies, three tank armies, one air army, and two cavalry-mechanized groups which were a little smaller than tank armies (see Table 6, 1st Ukrainian Front).

Several commanders in this front were later to achieve much higher positions. General (later Marshal) Andrey A. Grechko of the First Guards Army would become Defense Minister until his death in the 1970s, General-Colonel K. S. Moskolenko would head the General Staff IG, and the political deputy to General Zhuravlev of the 18th Army was General-Major Leonid I. Brezhnev.

Table 6 shows the strengths of the forces. Guards units normally had a slightly larger TO&E strength than regular units.

A. A. Grechko

A. S. Zhadov

Table 6. 1st Ukrainian Front: Men and Weapons Strengths - July 13, 1944

Formations	Combat Troops	Guns and Mortars (76mm and larger)	AT Guns	AAA Guns	MRLs
Armies					
First Guards	102,151[1]	1,669	327	152	28
Third Guards	106,925	2,207	422	114	192
Fifth Guards	65,578	879	153	61	—
Thirteenth Combined Arms	76,077	1,696	267	111	24
Eighteenth Combined Arms	72,556	1,351	236	19	209
Thirty-eighth Combined Arms	90,728	1,657	308	88	24
Sixtieth Combined Arms	96,719	1,841	353	72	340
First Guards Tank	29,301	383	54	116	40
Third Guards Tank	36,527	570	50	80	72
Fourth Tank	29,774	402	41	128	40
Second Air	41,768[2]	—	—	—	—
Groups					
Cavalry-Mechanized Group No. 1 (I Guards Cavalry Corps and XXV Tank Corps)	28,699	366	74	50	8
Cavalry-Mechanized Group No. 2 (VI Guards Cavalry Corps and XXXI Tank Corps)	28,969	376	48	55	20
Units directly under army group	41,783[3]	428	99	176	59
TOTAL	847,555[4]	13,825	2,432	1,222	1,056[5]

[1] Includes the IV Guards Tank Corps.

[2] Includes ground support troops.

[3] Includes the XL Rifle Corps, the Army Group's Reserve.

[4] With rear services, 1,200,000 effectives.

[5] Includes 546 M-30 MRLs.

Source: Polushkin [21, page 58]. The tables in Polushkin's article were translated in T. N. Dupuy and Paul Martell *Great Battles on the Eastern Front The Soviet German War 1941-1945*, Indianapolis: Bobbs-Merrill, 1982, page 172-182.

Ye. P. Zhuraulev

K. S. Moskalenko

Table 7 shows how the six armies in the first echelon of the Front were employed. Of the 440 kilometers of front (slightly more than the distance from Washington D.C. to New York City), only 26 kilometers were to be breakthrough zones, and these were spread out over great distances. Two armies, the 1 Guards and the 18th, were not attempting breakthroughs and had been assigned frontages of more than 100 km each. The troop and weapon concentrations in their zones were accordingly much lower than in the four armies making breakthroughs.

Table 7. L'vov-Sandomir Army Frontages[a]

CA armies	Total		Zone				Rifle corps designators
			Passive		Breakthrough		
	Km	Div	Km	Div	Km	Div[b]	
3 Gd A	65	12	57	3	8	9 = 8/-/1	120,76,21,22
13 A	82	9	78	4	4	5 = 4/-/1	24,27,102
60 A	30	10	22	2	8	8 = 5/2/1	23,15,28,106
38 A	40	10	34	2	6	8 = 7/-/1	101,67,52
1 Gd A	118	12	118	7	0	5 = -/5/-	107G,74G,30G,18G
18 A	105	9	105	9	0	0 = -/-/-	11,17G,95
5 Gd A	0	9	0	0	0	2d Ech	32G,33G,34G
47 Rifle C	0	3	0	0	0	Reserve	47
	440	74	414	27	26	24/7/4	Front total
		62					1st Echelon
		9					2d Echelon
		3					Reserve
	100%	100%	94%	36%	6%	64%	% of Total

[a]Source: Polushkin [21], page 61.

[b]Divisions in the first echelon/second echelon/reserves of the Front's first echelon armies.

Table 8 shows the armored forces available and their missions as mobile groups. None began in the first echelon of the Front. All were to exploit breakthroughs by infantry units.

Table 8. 1st Ukrainian Front Tanks[a]

Army/group	Tanks	Component corps and independent brigades	Supported army
1 GTA	346	11 Tk, 8 GMech	3GA, 13A
3 GTA	454	66 Tk, 7 GTk, 9 Mech, ITk Bde	60A
4 TA	387	10 Tk, 6 GMech, 93 GITk Bde	38A
CMG #1	303	1 GCav, 25 Tk	3GA, 13A, 1GTA
CMG #2	213	6 GCav, 31 Tk	60A
Total	1,703	11 + 2 Bde	

[a]Source: Polushkin *On the Sandomir Axis* [20, pages 26-31, 172-174]. Abbreviations: A = Army, Bde = Brigade, Cav = Cavalry, CMG = Cavalry-Mechanized-Group; G = Guards, I = Independent, Mech = Mechanized, TA = Tank Army, Tk = Tank.

Tables 9 and 10 show the extent of Soviet air participation in the operation. We will concentrate hereafter on the ground operation and planning.

Table 9. 2d Air Army OOB[a]

Type	Number
Bombers	679
Fighters	1,419
Shturmovik	1,046
Reconnaissance	102

[a]Source: *Military Historical Journal*, July, 1964, page 31-41 and also Polushkin [21, table 4, page 59] where a breakdown is given by unit. The table is translated in T. N. Dupuy and Paul Martell *Great Battles on the Eastern Front. The Soviet-German War 1941-1945*, Indianapolis: Bobbs-Merrill, 1982, page 175-176.

Table 10. 2d Air Army Sorties - July 13-August 29, 1944[a]

Periods	Total sorties	Fighter	Ground attack	Bomber[b]	Reconnaissance
July 13-28	30,366	15,858	9,579	4,805/1,282	124
July 29-August 29	18,359	10,247	4,029	3,564/3,076	519
Total	48,725	26,105	13,608	8,359/4,358	643

[a]Source: Polushkin [21], table 5, page 60.
[b]Numerator is total sorties; denominator is night sorties only.

Table 11 shows German forces. We will be examining the 60th Army on the Soviet side, and the 4th Tank Army on the German side. In addition to these forces, 9,000 partisans organized into 10 formations, and 53 detachments fought on the Soviet side in the area destroying enemy lines of communications.

Table 11. Army Group North Ukraine Opposing the Soviet 1st Ukrainian Front[a]

Army	Width km	Corps group	Divisions				Inf bde	Average km/div
			Inf	Tk	Motor	Total		
4 Tk A	115	1	10	2	--	14	--	8.2
1 Tk A	215	--	13	2	1	16	--	13.4
1 Fld A[b]	110	--	9	1	--	10	2	10.0
Total		1	32	5	1	40	2	10.5

[a]Source: Polushkin [21], table 5, page 60.

[b]Hungarian troops.

Table 12 shows the correlation of forces and means for the 1st Ukrainian Front in their zone which was 440 kilometers in length. While the ratios are nearer the desired norms in artillery and tanks, and satisfactory in aircraft, troop ratios are less favorable than on the Eastern Theater as a whole.

Table 12. 1st Ukrainian Front[a]

Category	Soviet	German	Correlation
Total personnel (incl rear)	1,200,000	900,000	
Combat unit personnel	843,772	600,000	1.4:1
Artillery and mortars	13,825	6,300	2.2:1
Tanks and SPG	1,979	900	2.2:1
Aircraft	3,052	700	4.4:1

[a]Sources: Polushkin [21, page 60], Polushkin *On the Sandomir Axis* [20, page 13], and *Soviet Military Encyclopedia*, Volume 5, 1976, pages 44-45.

THE 60TH ARMY

The 60th Army was commanded by General Pavel A. Kurochkin, later to head the Frunze Combined Arms Academy. He authored the 1960 standard reference on Soviet army operations. Kurochkin's 60th Army was to make the main strike of the Front along the axis Zolochev-Skvarzava-L'vov with the 15th Rifle Corps making the main attack along with the 28th Corps on its left wing. The 38th Army would be attacking adjacent to the 60th Army.

Figure 5 (60th Army Situation and Mission) shows the position of the 60th Army and its attack axis starting southeast of the town of Brody. The 3rd Guards Tank Army was planned to be committed through the zone of the 60th Army on the second day of the breakthrough as a mobile group. The tank army was to link up with the breakthrough group of the 13th Army striking southwest from north of the 60th Army's position. The plan was to encircle enemy forces in the area of Brody.

Table 13 shows the forces in the zone of the 60th Army. No Soviet source found gave a correlation of the forces in the army zone. There is data for the corps of interest.

Table 13. 60th Army Zone

Category	Soviet	German	Correlation
Combat unit personnel	96,719		
Artillery and mortars	1,841		
ATG	353		
MRL	340		
AAA	72		
Tanks and SPG	100		

Source: Polushkin [21], table 10, page 58.

THE 15TH CORPS

The 15th Rifle Corps was under command of General N. V. Tertyshkin. Figure 6 (15th Rifle Corps Zone of Advance) shows the planned attack of the 15th Corps with two of its divisions (the 336th Rifle Division on the right wing, and the 322d Rifle Division on the left wing) forward, and one (the 148th Rifle Division) back. The corps had been assigned a 5.5-kilometer front, all of which was planned to be breakthrough zone. The immediate objective of the 15th Corps was about 8-10 km deep and the mission of the day was about 20 km deep just beyond the town of Zolochev. On the second day, after the corps frontage had been widened from 5.5 to about 9 km, the 3d Guards Tank Army was to be committed along the line indicated in Figure 6 with the two diamonds just beyond the line of the first day mission of the corps.

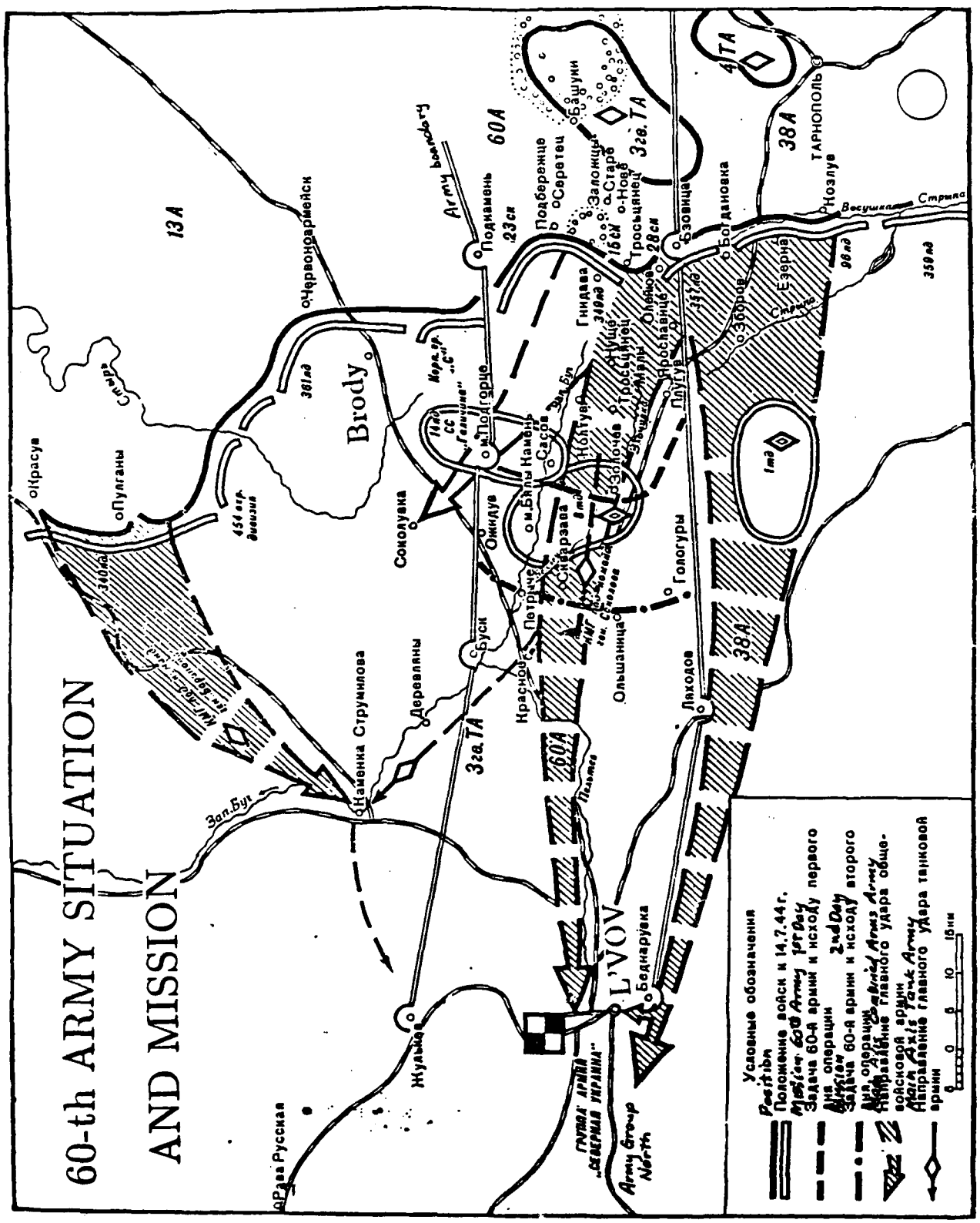

Figure 5. 60th Army Situation and Mission

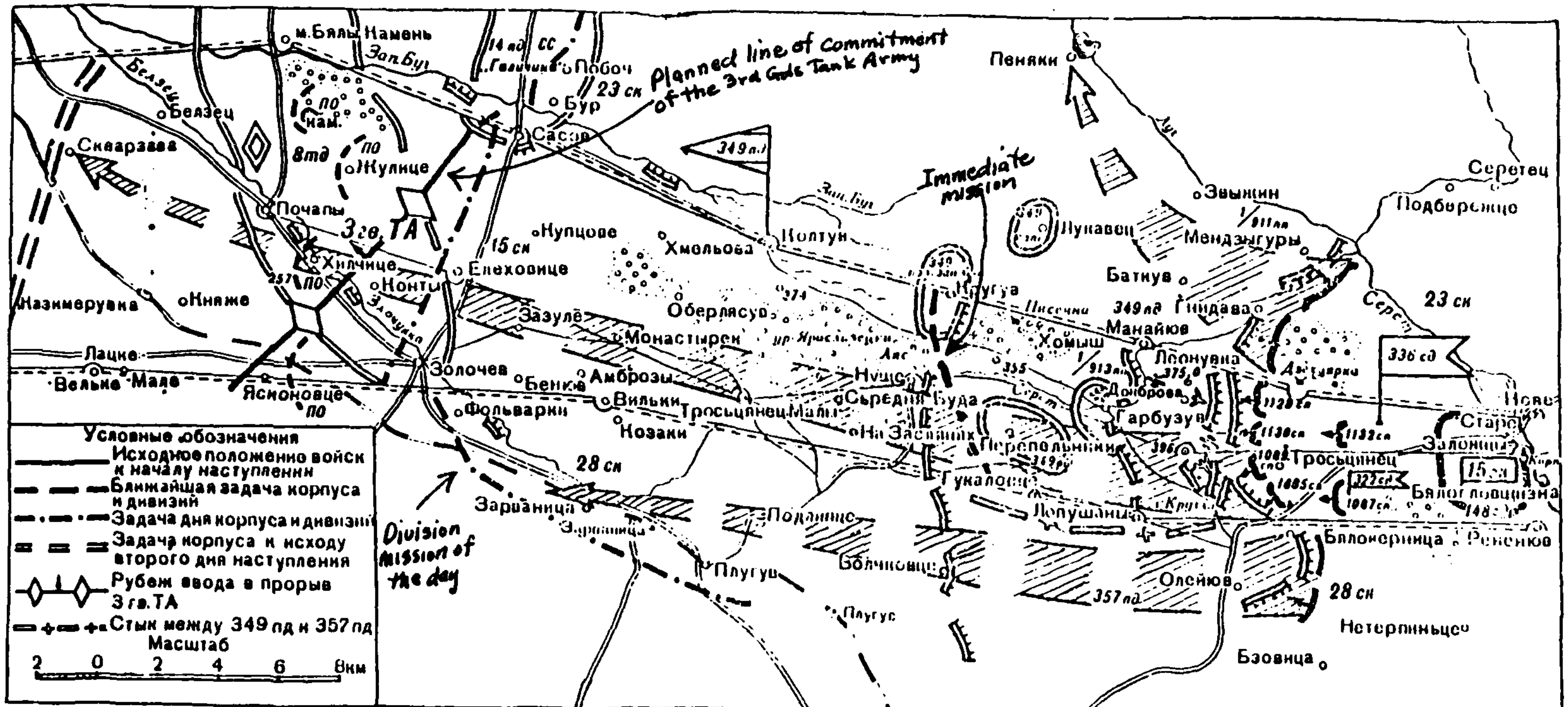

Figure 6. 15th Rifle Corps Zone of Advance

Table 14 shows a correlation of forces and means in the 15th Rifle Corps area estimated from data in Smekalov [22, page 10-13]. The Soviet 15th Rifle Corps was to attack the German 913th Infantry Regiment of the 349th Infantry Division. The concentration of Soviet forces in the zone (with infantrymen numbers estimated from average counts of subordinate units) put two of the correlations of forces above the Soviet norms: about 11:1 in infantrymen in the front lines and 11:1-12:1 in artillery.

Table 14. 15th Rifle Corps Zone, 5.5-km Frontage[a]

Category	Soviet 15 corps	German 913 Regt	Correlation of forces and means
Infantrymen (est)	7,000	600	11-12:1
Combat personnel (est), incl German division res			5.1:1
Artillery and mortars	825	70-80	11-12:1
Tanks and SPG	34	2	1.7:1

[a]Source: [22].

A Soviet commander would have looked at the total number of combat personnel in the zone, not just infantrymen, and a part of the division reserve may have been counted. No detailed counts were given in the sources used here. The companies of both sides were below TO&E strengths.

The German operational reserves were probably only counted at the Army level calculation. It is not clear if all of the German division reserves would have been considered in tactical correlation of forces calculations. Probably only the German division reserves within the zone of advance of the 15th Corps would have been counted if Soviet intelligence had been able to locate them with sufficient accuracy.

The German 1st Panzer Army has its divisions stretched most thinly of the three Armies defending against the Ukrainian Front. The average division of the 1st Panzer Army had over 13 kilometers to defend while the 4th Panzer to the north had about 8 kilometers per division, and the 1st Hungarian to the south had about 10 kilometers per division (table 11). This probably influenced the Soviet selection of breakthrough zones.

Separate calculations were probably done for front line troops and for reserves that could be brought to bear rapidly. The Soviet reporting is not always clear as to what data is historical reconstruction and what the Soviet commander knew at the time. The correlation of forces in personnel was probably nearer 5:1 or even somewhat less when the German division reserve was taken into account.

Our estimated tank correlation of 1.7:1 was insufficient according to then current Soviet norms, but the absolute number of tanks was small (20 German tanks against 34 Soviet tanks) and the majority of Soviet tanks were in the second echelon massed for the tank army attack through the zone to exploit the breakthrough. Thus all of the essential norms were met. The

correlation of forces in aircraft was not presented in Soviet writings at this level of command. It would not be appropriate for tactical levels of command as aircraft are employed on an operational scale (that is, by armies and fronts).

The tactical commander probably was more concerned with meeting the norms for tactical densities than meeting norms for correlations of forces. The tactical density norms are intended to allow for some of the enemy reserves which may not be in the immediate zone of the initial attack. They also apply to branches such as engineers, where a correlation of forces would be relatively meaningless as the two groups do not directly fight each other.

The Germans has a divisional reserve consisting of the 349th Field Reserve Battalion in the region of Kruguv (about 10 kilometers to the rear along the right flank of the line of advance of the 15th Corps and partly in the zone of the 23rd Rifle Corps north of the 15th), and the 349th Reconnaissance Battalion in Perepel'niki (about 8 kilometers to the rear in the left center of the zone of attack).

The German operational reserve consisted of three divisions. The 14th Infantry Division SS "Galich" was in the region of Sasov and northward. The 8th Tank Division (120-130 tanks) was in the region of Byaly Kamen', Zolochev. The 1st Tank Division was in the region south of Pluguv in the zone of the Soviet 8th Rifle Corps 12-15 kilometers south of the 15th Rifle Corps zone [22, page 11]. The operational reserve divisions were 20 to 40 kilometers or more behind the front lines. The 8th and 14th Divisions could be called into action on the first day along the second line of defense running from Kruguv to Nushche. The use of the 1st Tank Division depended upon the lack of activity in the corps zone south of the 15th Corps.

Figure 7 shows the rough estimated force counts, including the average number of men per company. This was an important measure of unit capability found repeatedly in Soviet writings on tactical engagements. After several years of combat, attrition had reduced most units well below TO&E strength. The Soviet penchant for large masses of artillery stands out among the other counts.

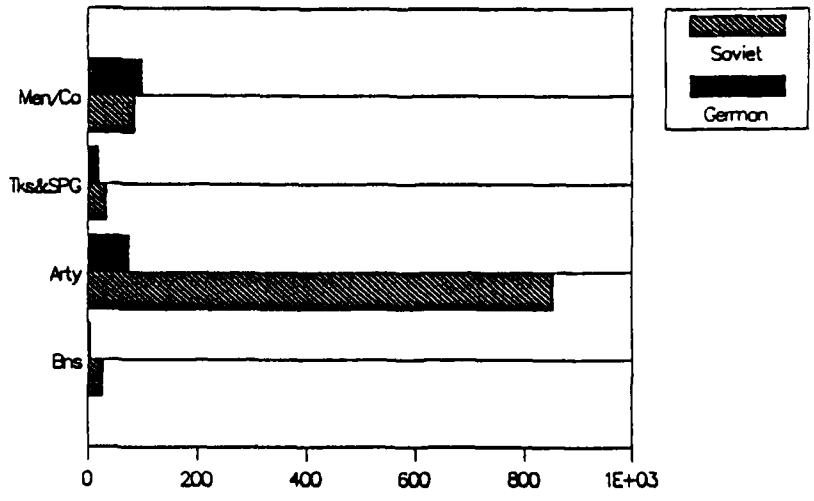

Figure 7. Force Counts

THE 322d AND 336th DIVISIONS

Next, let us examine the two forward divisions of the 15th Rifle Corps. Figure 8 shows the standard diagram used by the Soviets to describe the structure of the attacking formation. While the entire 5.5-km frontage of the 15th Rifle Corps is breakthrough zone, the distribution of forces within this zone is nonuniform and heavily weighted behind the zone of attack of the 322d Rifle Division. This division attacked on a 2.1-km frontage while the 336th Rifle Division attacked on a 3.4-km frontage. Furthermore, about two-thirds of the artillery of the 15th Rifle Corps (which had been heavily reinforced from army, front, and reserves of the Supreme High Command (RGVK)) was supporting the 322d Rifle Division. Note also that even the 1132d Rifle Regiment of the 336th Rifle Division was located behind the 1130th Rifle Regiment on the left wing of the 336th Division so that it could support the 322d if required.

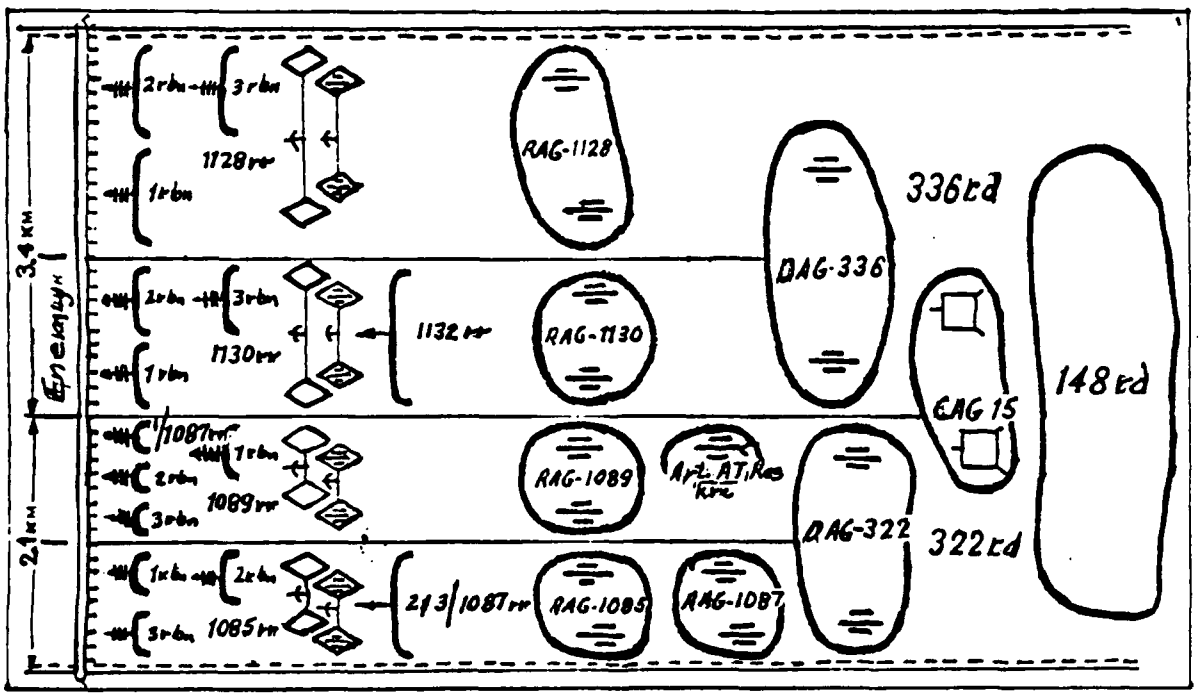

Figure 8. 15th Rifle Corps Formation

There is a Soviet guideline that says, in effect, uniform distribution of forces in the attack leads to failure. A commander must mass in one area and use economy of force elsewhere to gain the requisite superiority over the enemy. In this case, the artillery superiority in the zone of the 322d Rifle Division is at least 15:1 and it may have been as high as 20:1, depending on whether the Germans had 70 or 80 artillery pieces in the zone, and how much of the 15th Corps Artillery Group is counted in the zone of the 322d Division. Troop superiority was probably about 7:1 or possibly a little more. Thus, at the tactical level, the correlation of forces met the norms and exceeded them.

The artillery massing in the other Army zones was even more intense than in the zone of the 60th Army, according to an article in the Soviet Military Historical Journal (see Table 15). This article may have counted small caliber mortars normally omitted from operational calculations. The 60th Army breakthrough zone total included the 28th Corps which was also making a breakthrough attempt.

Table 15. Tactical Densities

Army	Breakthrough sector, km	Rifle div		Arty/Mortars		Tanks/SPG	
		No.	km/div	No.	per km	No.	per km
3 Gds	8	9	0.9	2,098	262	101	12.6
13	4	5	0.8	1,159	290	63	15.8
60	8	8	1.0	1,965	246	100	12.5
38	6	8	0.8	1,809	301	85	14.2

Source: Polushkin [21, page 62].

Figure 9 (Correlation of Forces, Eastern Front to Division) shows the massing at multiple levels of command. The artillery superiority was possible because of the large number of nondivisional artillery allocated from the Reserves of the Supreme High Command, the 1st Ukrainian Front, and the 60th Army. Within the 15th Corps, nondivisional artillery easily exceeded the organic artillery. Artillery still makes up the largest proportion of nondivisional units belonging to fronts and armies. Engineer units are also extensive.

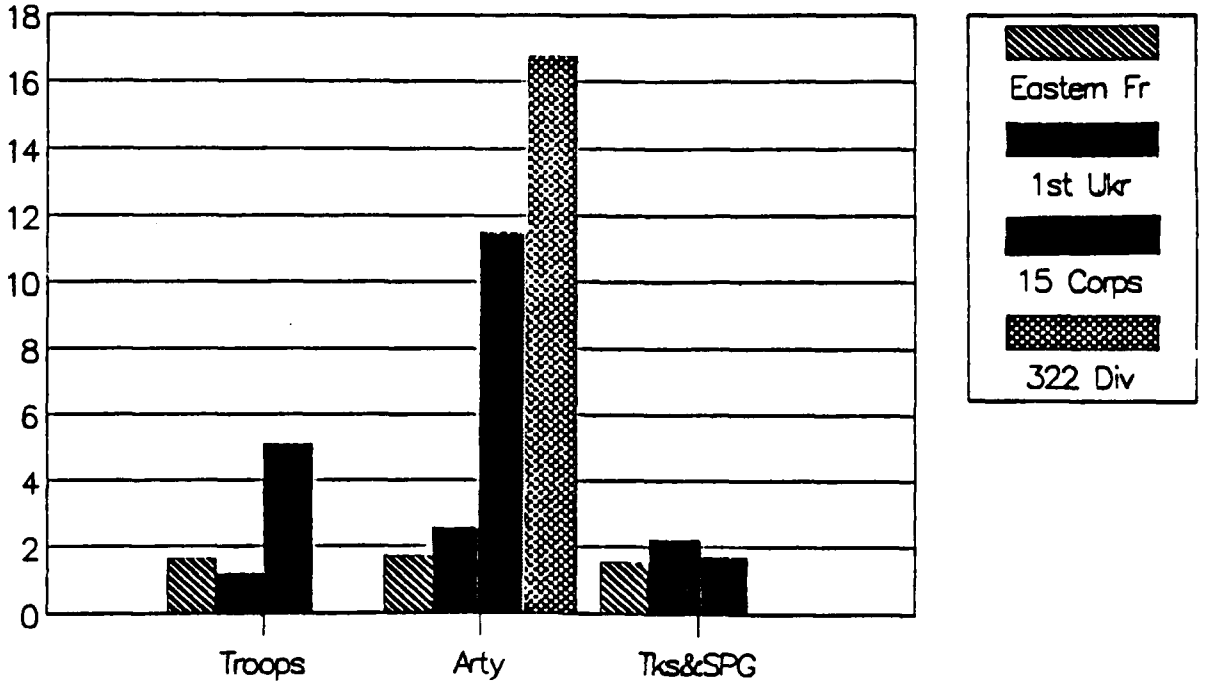

Figure 9. Correlations of Forces, Eastern Front to Division

ARTILLERY PREPARATION FOR THE BREAKTHROUGH

Figure 10, taken from a 1984 book on artillery operations, shows the targets in the 15th Rifle Corps zone of the artillery preparation. The main German defenses were 4-6 km in depth, with 3-4 lines of trenches. The 419th Field Reserve Battalion and a recon battalion were in the division reserve, and the 14th Infantry Division of SS Galich, and the 8th Tank Division of 120-130 tanks were in the German operational reserve available to support the forces in the zone. The operational defenses of the German forces were about 50 km in depth.

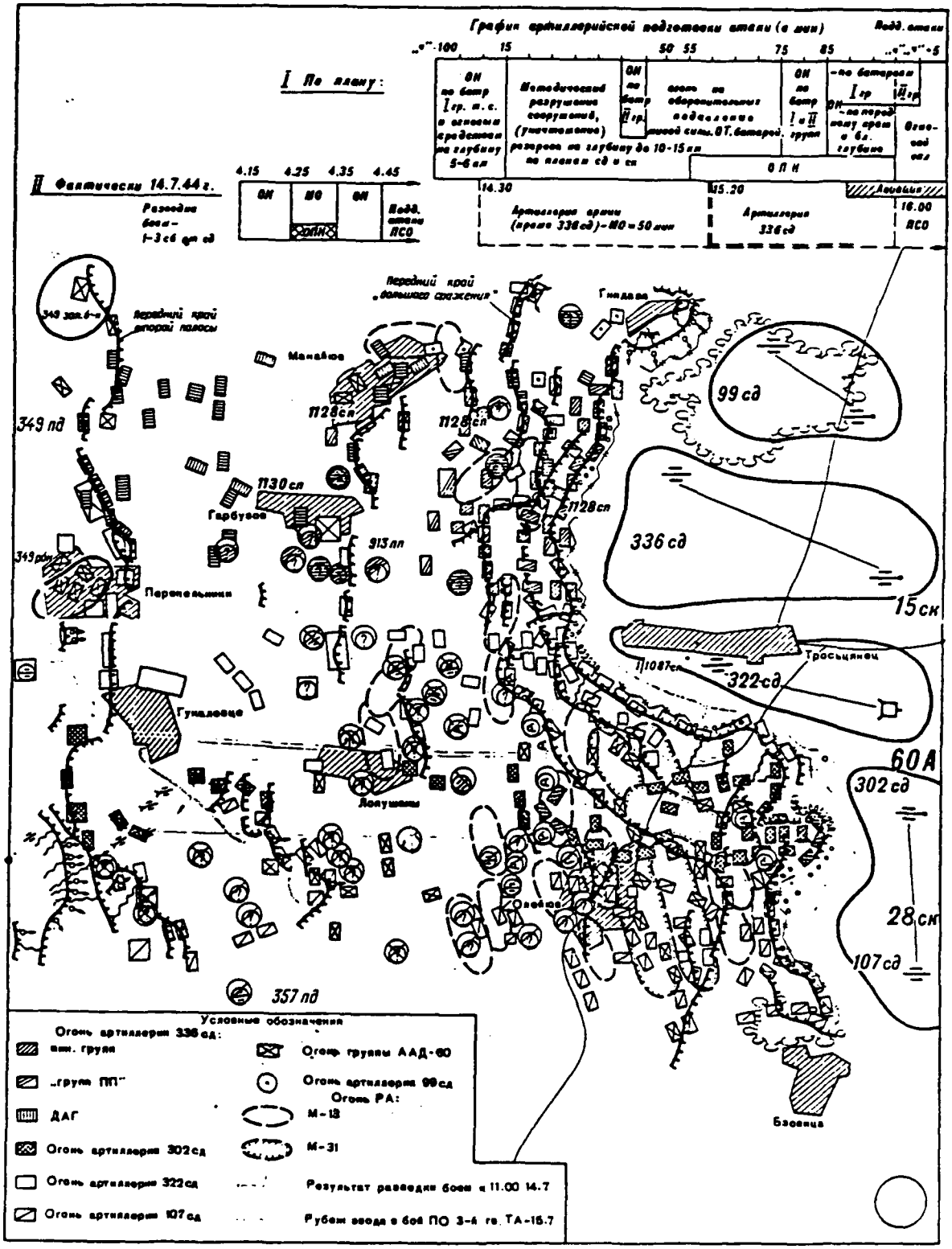

Figure 10. 15th Rifle Corps Targets

Figure 11 shows the Soviet weapons available by caliber of tube. Figure 12 shows the number of rounds planned to be fired by each caliber of weapon during each of the four phases of the artillery preparation.

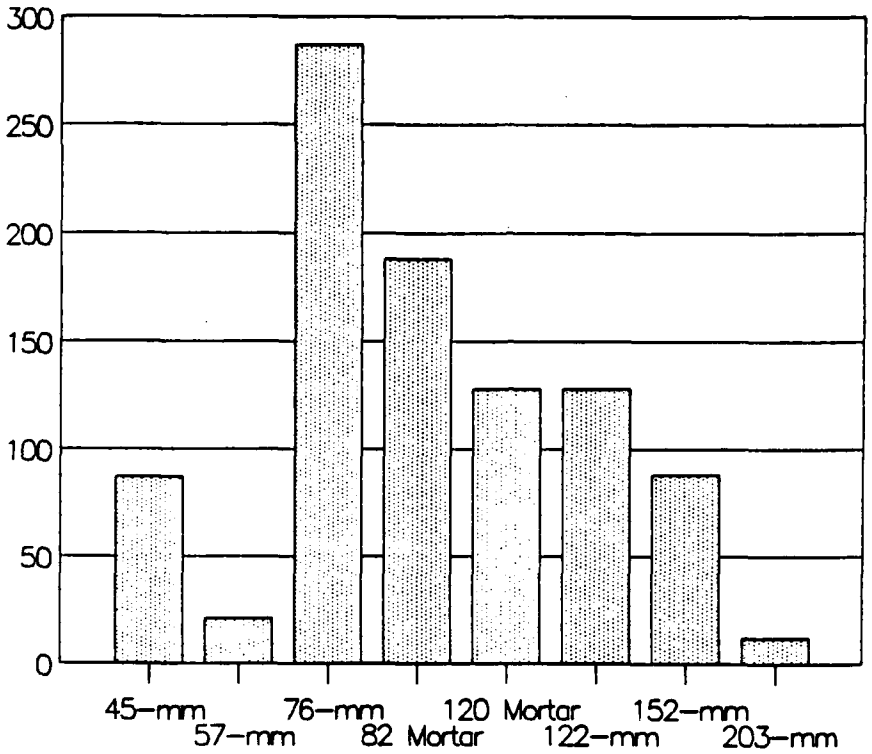

Figure 11. Number of Weapons

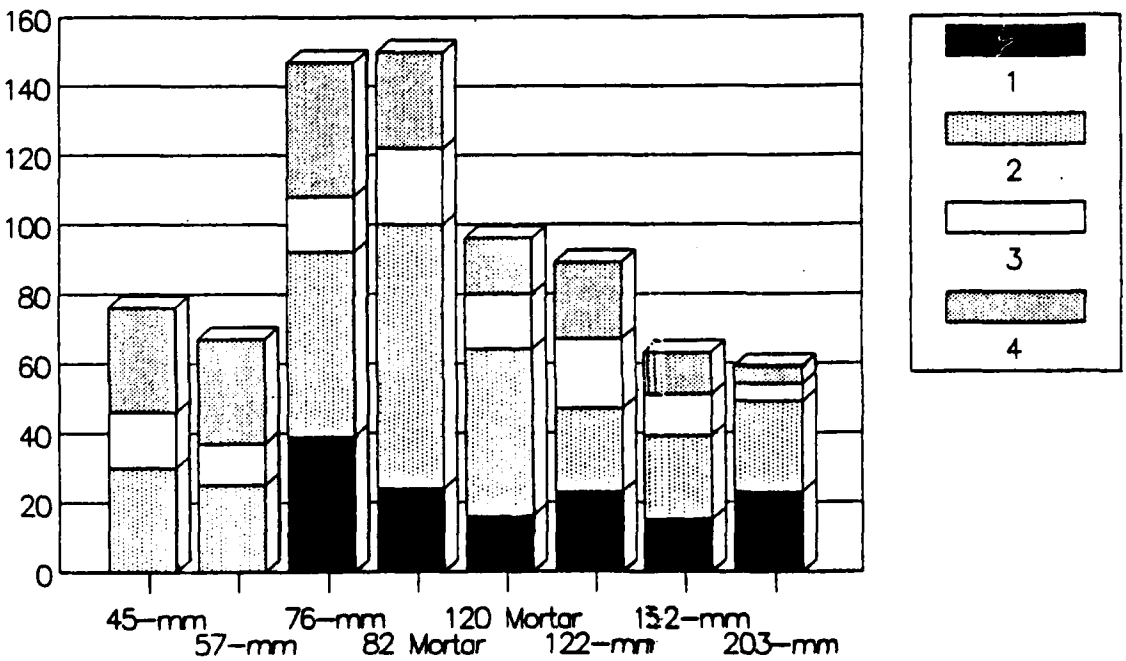

Figure 12. Artillery Preparation - Firing by Phase

In Figure 13 (Lethal Area, by Round and by Weapon Type), the bar graph shows the lethal area against personnel standing of a single round for each caliber of weapon as taken from a Soviet World War II book on artillery. As can be seen, the 120-mm mortar shell was assumed to have a lethality against this class of targets which was approximately equal to that of a 203mm artillery shell. The 82mm mortar shell is not much less lethal than the 122mm artillery shell. Using these individual round lethalities, the number of weapons of each type from Figure 11, and the number of rounds fired by each caliber of weapon from Figure 12, the line graph in Figure 13 is the total lethal area for the L'vov-Sandomir artillery preparation, by weapon caliber, in terms of hectares [1 hectare = 100 x 100 meters]. The main point is that the largest contribution to "artillery" was the mortars. Against infantry "under cover," mortars would not have been as effective, but even then they were a major part of the force's capability.

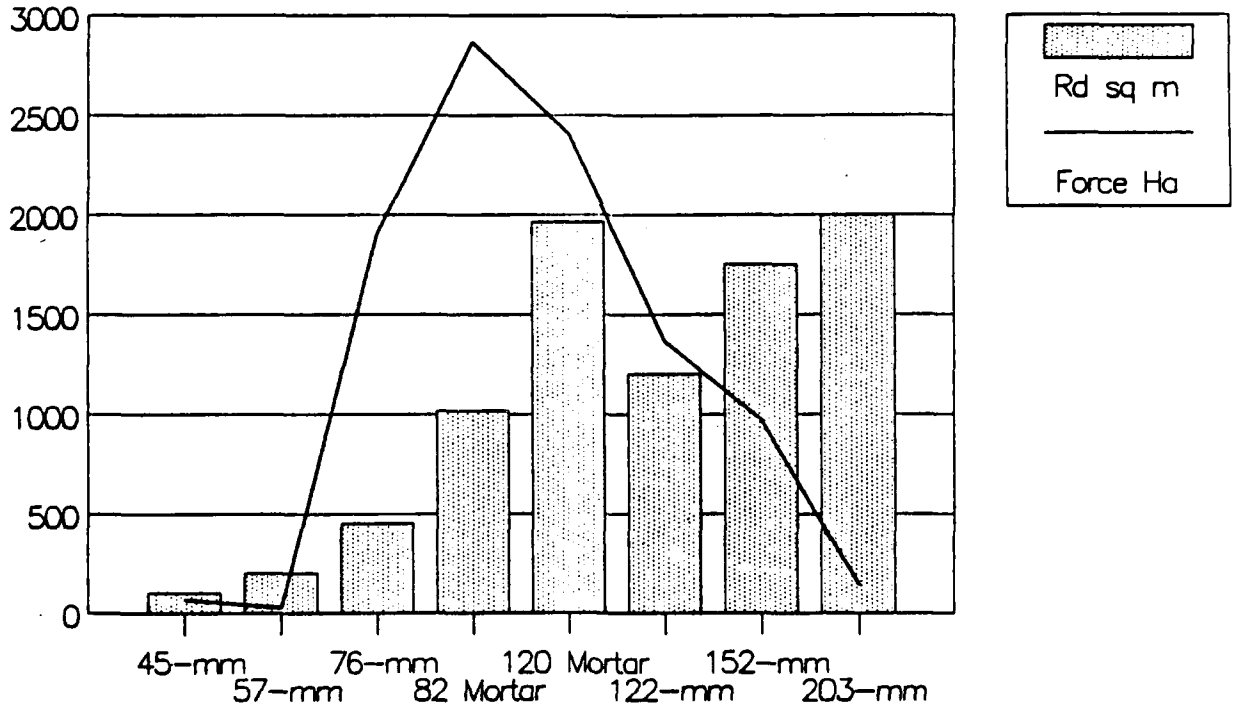

Figure 13. Lethal Area, by Round and by Weapon Type

The 1st Ukrainian Front Staff had to start from the planned breakthrough zones and allocate the artillery of the Reserves of the Supreme High Command (RVGK) and the Front's own independent (nondivisional) artillery units to the armies for the breakthrough. The 60th Army then had to allocate this artillery, the artillery of its second echelon and reserves, and its own 60th Army nondivisional artillery to their corps to accomplish the objectives of the artillery preparation.

Such allocations required calculations to check on meeting all of the constraints required according to Soviet fire planning. Constraints would include massing artillery to achieve the required density of guns and mortars per kilometer of front. Regulations prescribe densities based on assumptions as to how many enemy targets can be expected to be found in the breakthrough zone, the allocated time to accomplish the fire missions, and on the necessary barrage fire to support the advance of troops following the artillery preparatory fires. Specific target intelligence might add more requirements than those of the regulations.

In the case of the 15th Infantry Corps, about two-thirds of the total artillery and mortars available to the commander had been allocated from army and front sources. Table 16 is a list of some of the possibilities that were resorted to when artillery fire requirements (time constraints, ammunition constraints, number of targets, target protection, target mobility) exceeded the available resources.

Table 16. Means of Increasing Fire

1. LENGTHEN TIME OF PREPARATION.

2. INCREASE LOCATION ACCURACY OR CORRECT FIRE BY OBSERVATION TO DECREASE EXPENDITURE OF ROUNDS (A 25 PERCENT DECREASE IS PERMITTED UNDER THESE CONDITIONS).

3. ADD GUNS, MORTARS, AND MRL FROM:
   A. SECOND ECHELON UNITS.
   B. ARMY AND FRONT RESERVES.

4. USE SUBSTITUTES FOR SOME TARGETS AT SHORT RANGE.
   A. SMALL ARMS FIRE.
   B. TANK FIRE.

5. MOVE ARTILLERY CLOSER TO THE FLOT SO THE NORMS REQUIRED ARE LESS AND THE REGIME OF FIRE MAY BE INCREASED BY USING SMALLER CHARGES.

6. FIRE PART OF THE NORM DURING THE ADVANCE TO THE CONCENTRATION AREA, OR DURING THE SUPPORT PHASE FOLLOWING THE ARTILLERY PREPARATION.

7. USE ARTILLERY OR AIR STRIKES PRIOR TO THE TIME OF THE ATTACK.

8. LOWER CRITERIA OR FIRE 1/2 TO 3/4 OF NORMS AGAINST LESS CRITICAL TARGETS.

Of the many artillery preparations for multi-Front and Front-level breakthrough operations during World War II, it appears that no two were ever completely identical in duration or phases. The Soviets tried to be unpredictable to prevent the Germans from taking advantage of stereotyped fire plans.

BATTLE OUTCOME

The 15th Rifle Corps in the period from 14 to 16 July 1944 did not progress nearly as rapidly as planned (Figure 14). The first day left the corps only about a third of the way to the first day's objective, and about the same distance was covered the second day. The corps frontage had not been widened so the 3rd Guards Tank Army was not committed as a mobile group on the second day as had been planned. The Germans had brought up a reserve division and were fighting stubbornly (Table 17).

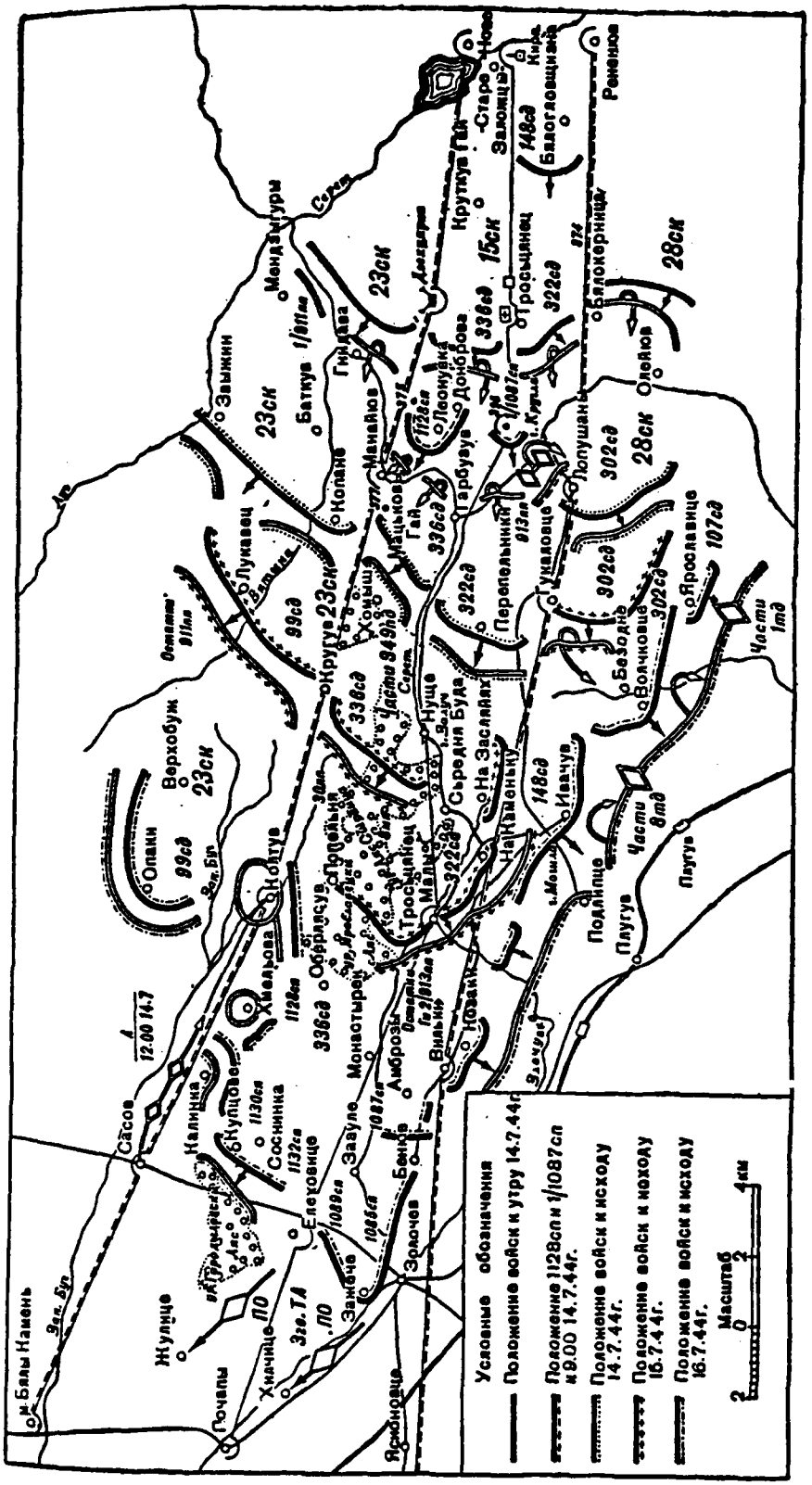

Figure 14. 15th Rifle Corps, 14-16 July 1944

Table 17. Reinforcements Sent to German Forces, July 13-August 29, 1944

Period	Divisions					Bdes	Total div equivalent
	Inf, lt inf, sec	Mtzd	Ski	Panzer	Total		
July 13-27	3	1	--	1	5	--	5
July 29-August 28	9	--	1	2	12	4	14
Total	12	1	1	3	17	4	19

Source: Polushkin [21], table 11, page 62.

By the third day, the 4-6 km wide corridor had been extended to about 18 km in length. The tank army commander, General P. S. Rybalko, made a bold decision and requested permission to attack in a single column through the corridor. His army advanced through the corridor, and the next day, the 4th Tank Army followed. Soviet histories claim that this was the only case in the war where two tank armies were committed in succession on such a narrow front (4 km) on a single march route.

At this point, the next few days were a struggle to see who was surrounding whom. The Germans attempted to cut off the mobile group by attacking on the flanks of the corridor while the Soviets attempted to link up with the 13th Army attacking from the north to encircle a large group of German forces near Brody. The Soviets eventually succeeded and annihilated or captured eight German divisions (see Figure 15, 15 Rifle Corps, 17-22 July 1944).

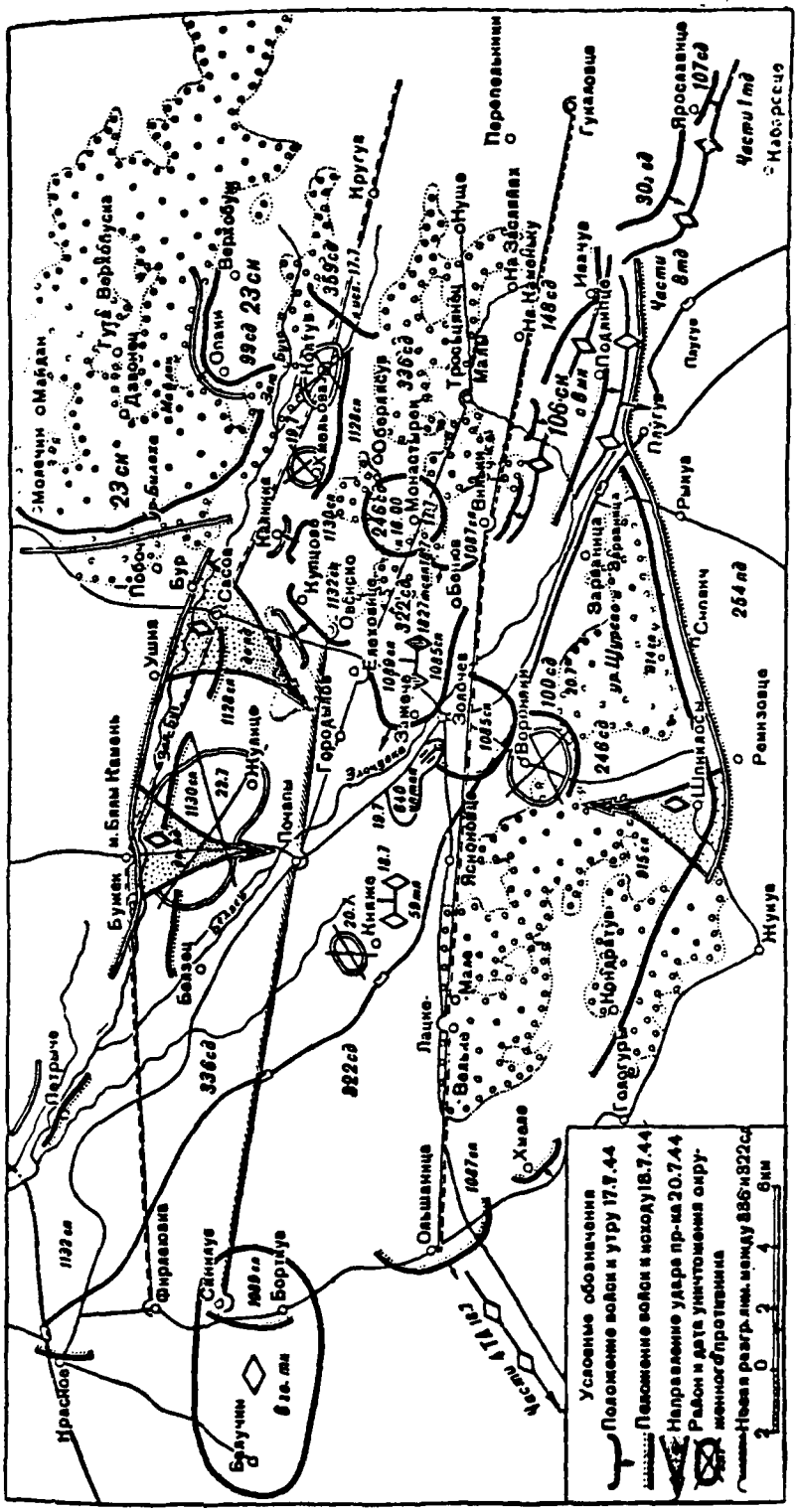

Figure 15. 15th Rifle Corps, 17-22 July 1944

The city of L'vov was then liberated after the two tank armies attacked from the north and south while the 60th Army attacked from the east.

After the capture of L'vov, the second half of the operation, which will not be covered here as this report is concerned mainly with the initial staff planning for a major operation, led to a further advance and crossing of the Vistula River. A bridgehead was established on the far side. The forces then moved relatively little during a lull from late August into October. This period involved the planning of the next operation as well as the refurbishment of units and restoration of combat capability.

The daily rates of advance are shown in Table 18. They originally appeared in Russian in the Military Historical Journal. Trevor Dupuy and Paul Martell translated the "Battles in Figures" sections of the journal and published the data as a book with extended commentary on the operations.

Table 18. Average Daily Rates of Advance of the 1st Ukrainian Front (km), July 13 - August 29, 1944

	Depth of Adv (km)	Combined Arms Armies							Tank Armies			Mech Corps	
		Second Guards	Thirteenth	Sixtieth	Thirty-eighth	First Guards[1]	Eighteenth	Fifth Guards	First Guards	Third Guards	Fourth	No. 1	No. 2
Phase one (July 13–27)													
Breakthrough (July 13–18)	45–50	7–8	10	7–8	2–3	—	—	—	—	—	—	—	—
Exploitation (July 19–27)	—	—	—	—	—	—	—	—	40–45	30	20	30	—
Pursuit (July 19–27)	210–220	17–18	21–22	8–9	9–10	10–11	c. 12	—	30–35[2] / 50–60	20–25[2] / 60	14–15	30–35[2] / 50	22[3]
Phase two (July 29–August 29)													
Advance toward the Vistula and capture of bridgeheads (July 29–August 3)	34–40	5–6	10–11	12–13[4]	12–13	2.2	2.3	—	10–11	12–13	13–14	—	—
Consolidation and expansion (August 4–29)	40	1	1	1.2	1	—	—	8–9[5]	1–2	1–2	1–2	—	—

[1]First Guards and Eighteenth Combined Arms armies transferred to the 4th Ukrainian Front as of August 5, 1944.

[2]Denominator shows maximum daily rate of advance (km).

[3]From July 23, 1944.

[4]From July 29-August 10, 1944.

[5]August 4-10, 1944.

Source: Polushkin [21, table 12, page 63] and translated in T. N. Dupuy and Paul Martell *Great Battles on the Eastern Front. The Soviet-German War 1941-1945*, Indianapolis: Bobbs-Merrill, 1982, page 182.

CASUALTIES AND EQUIPMENT LOSSES

A Soviet military medical book claimed overall First Ukrainian Front losses during the L'vov-Sandomir Operation were 0.9 percent per day casualties and 0.8 percent per day sick. This probably includes everyone who was lost for at least 1 day of duty from his unit. Thus, individuals could have been counted more than one time during the 6 weeks of the operation.

There are two other bits of casualty and loss data. Figure 16 (Personnel and Tank Losses) shows losses of personnel and tanks in two corps of the operation, neither in the zone we have examined. One is the 8th Guards Mechanized Corps of the 1st Guards Tank Army on the northern wing of the Front. The other is the 25th Tank Corps of Cavalry-Mechanized Group #1 which also operated north of the 60th Army in support of the 3d Guards Army, the 13th Army and 1st Guards Tank Army. An article in Military Historical Journal provided this data and comparable data on a few other operations. Tank losses reached 100 percent in each case between 12 and 21 days. Of course many of these tanks were repaired and returned to duty. Tank losses over an operation were reported up to at least 240 percent, assuming repair.

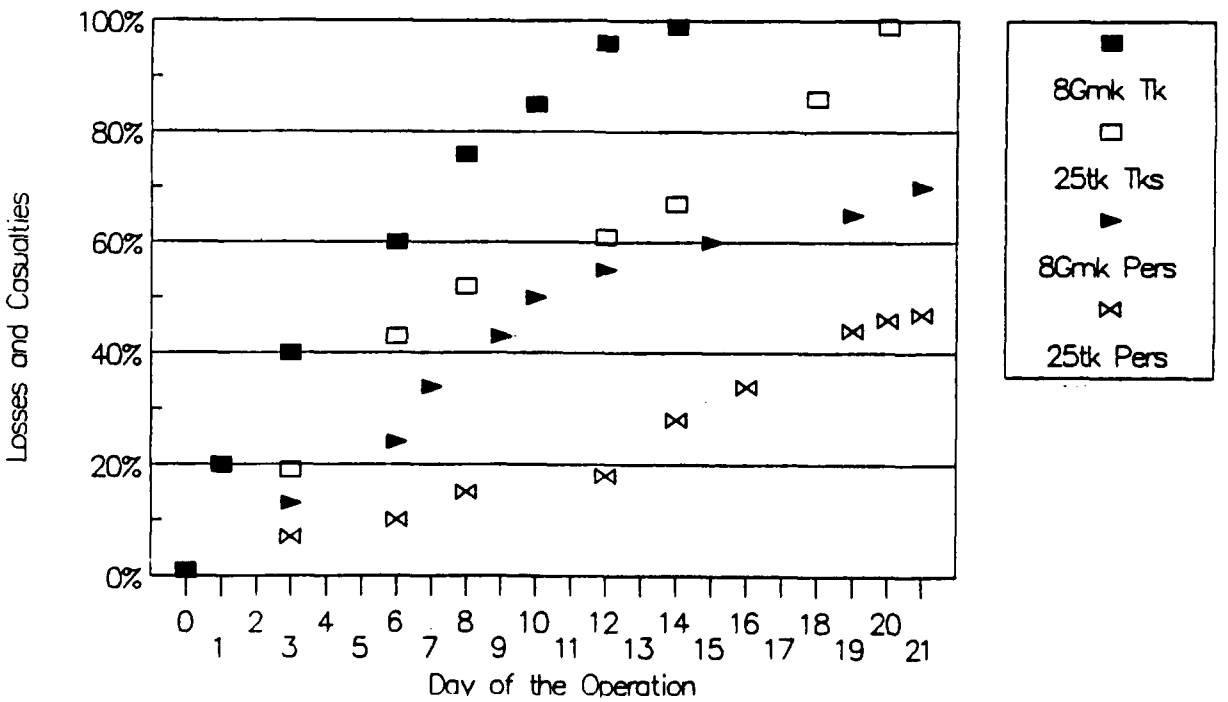

Figure 16. Personnel and Tank Losses

Table 19 shows the losses in tanks in the northernmost army of the First Ukrainian Front. This appears to be the only other loss data available on the L'vov-Sandomir Operation. An average for 9 operations is given for comparison.

Table 19. Tank Losses and Repairs, 1st Guards Tank Army

Days	Initial tks	Losses tks	% Initial	Permanent		Avg daily loss		
				Tks	%	Loss	Perm	Repairs
12	419	429	102.4	121	28.8	8.5%	2.4%	6.1%
Avg for nine operations by five armies								
16	613	547	82	184	25	5.3%	1.7%	3.6%

OBSERVATIONS

A number of observations can be made which ought to be kept in mind when reading about present day Soviet operational art and tactics. The following observations also include a few not actually covered above, but which can be drawn from reading the references in the appendix. Italics indicate items which seem of particular relevance today.

1. Soviet histories include far more quantitative data about operations than found in most Western reporting of operations.

2. The breakthrough zone was a very *small portion* of the overall front.

3. Engineer preparations were extensive, and *engineers make a key contribution* to maintaining the advance in a breakthrough zone.

4. About 9,000 Soviet *partisans* in the German rear helped to create problems for the Germans.

5. Two divisions of the 28th Corps attacked on only 5.5 km of front.

6. Even the two divisions in the breakthrough zone were *assigned significantly different frontages*, and the massing in the zone of the 322d Rifle Division was much greater than in the zone of the 336th Rifle Division.

7. Attached and supporting nondivisional artillery was in the majority in the 28th Corps breakthrough zone.

8. *Mortars* contributed more than guns and howitzers to lethal area in the artillery preparation.

9. A 3:1 force ratio was not an absolute guarantee of success.

10. Ratios of 5:1 and more still depended upon good leadership and timely action to achieve success.

11. The Soviets massed forces to ratios which were well in excess of those stated in regulations: *the prescribed ratios are minimums.*

12. Extensive *massing requires camouflage and deception* to achieve the desired force ratios in order to prevent countermoves by the opponent.

13. Despite high force ratios, *timely* German *counteractions* kept the Soviets from achieving initial objectives on time.

14. Artillery was massed to much greater ratios than any other branch.

15. Despite large, unfavorable force ratios, the German *defense in depth* prevented a major rout, although the Germans did give up extensive Russian territory.

16. The Soviets ultimately achieved their terrain objectives; *delay is not equivalent to defeating an enemy.*

SUMMARY: TROOP CONTROL STAFF WORK, CALCULATIONS

In summary, Soviet breakthrough planning requires deciding:

1. What objectives are to be achieved;

2. Where the breakthrough and passive zones are to be located and what massing of forces is required;

3. How to allocate nondivisional forces and means;

4. How to regroup forces and prepare for the attack; and

5. How to do all of the above in secret so that the enemy does not regroup and nullify the planned superiority in the breakthrough zones.

The latter requires camouflage, deception, night movement of troops to new positions, and so forth. The deception has to be maintained as long as possible, even after the initial attack so as to delay the prompt employment of enemy reserves at the decisive points in time and space. Without the deception plan, all of the rest of the correlation of forces and means calculations may have been for nought.

All of this entails staff calculations which include: (1) correlations of forces and means in various zones and at various times during the operation; (2) operational and tactical densities of forces; (3) planning the artillery preparation and ammunition supply to further shift the correlation in the breakthrough zone; (4) march plans to get to starting points; (5) the outcome and what can happen under different variants of enemy counteractions in terms of resulting correlation of forces and means, expected casualties and predicted rates of advance.

Today the Soviets intend to use computers to mechanize many of these staff tasks. In order to achieve planning times measured in terms of hours rather than months (as in 1944), the need for computer assistance is clear. At the same time, they frequently mention a need to retain a manual backup capability in case of nuclear war where electromagnetic pulses could deny use of computers.

General-Major Vayner, a specialist on troop control and the author, of two editions of the book, Tactical Calculations, has stated the following:

> **"Two extremes are possible: worship of computed data, and, the other extreme, under appreciation of computations. Both of these extremes are equally harmful and impermissible."**
>
> Gen.-Major A. Ya. Vayner
> Tactical Calculations, 1977

The Soviets continually point out that calculations are only a part of the means of reaching a decision. They are an objective starting point, but the final decision is always that of the commander, based on his military judgment. In this operation, the calculated superiorities were achieved, but decisive command action at the critical moment was critical in achieving victory during the initial phase of the operation when the advance fell days behind the plan. Calculations are an objective place to begin an understanding of the possibilities, but all of the qualitative factors must be taken into account in the commander's decisionmaking, and ultimately, determined troops and good leadership convert plans into the achievement of objectives.

APPENDIX A

BIBLIOGRAPHY OF RUSSIAN BOOKS ON THE L'VOV-SANDOMIR OPERATION

Most of the books listed here were used in the preparation of this report. A few are cited to indicate the extent to which information is available in Russian on just one Soviet World War II operation.

* * *

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APPENDIX B

CORRELATIONS OF FORCES COUNTING RULES

What ought to be included in correlations of forces is not always clear as the concept is not used entirely consistently. The following is a list of rules on how to count correlations of forces and means in historical analysis given by Colonel Kravtsov, *Military Historical Journal*, 1970.

- Compare comparable forces
- List both personnel present and direct participants
- Categorize by class, caliber, and type as well as arm
- Count obsolete equipment if the enemy has similar equipment, otherwise separately
- Only count main killers, e.g., omit rear support units' small arms
- Categorize guns, mortars, and MRL separately by caliber, omitting small calibers
- Count weapons in role actually used, not just by type (footnote special cases), e.g., AAA against tanks are ATG
- Separate tanks from self-propelled guns
- Count obsolete tanks separately
- Categorize aviation by type
- Show ability to supply with ammunition
- Comment or footnote mobile systems' POL shortages

APPENDIX C

SOVIET MILITARY ENCYCLOPEDIA

Article on Correlation of Forces and Means

The definition of correlation of forces and means given here is a translation from the Soviet Military Encyclopedia in 1976. Comments and clarifications are given in square brackets [ ]. *Parentheses and italics correspond to those in the original.*

The correlation of forces and means is an objective indicator of the combat power of opposing sides, permitting determination of the degree of superiority of one of them over the other. The correlation of forces and means is determined by means of comparison [sravneniya] (juxtoposition [sopostavleniya]) of available data on quantitative and qualitative characteristics of subunit [battalions and smaller size forces], unit [regiments and brigades], large unit[divisions], armaments of our troops (forces) and the enemy. Correct calculation and estimation of the correlation of forces and means contributes to making substantiated decisions when preparing for and in the course of operations (combat), for the timely creation and support of the necessary superiority over the enemy on selected axes (see *Massing of Forces and Means*, and *Superiority Over the Enemy* [Editorial note: these references are to other articles in the Soviet Military Encyclopedia.]. Analysis of the correlation of forces and means also permits a deeper investigation into the essence of past conduct of operations, battles, and combat. Depending on the command level the correlation of forces and means is determined on strategic, operational, and tactical scales. When preparing for an operation (combat) it is usually calculated for the entire zone of combat operations, on the main and other axes (sectors), and also for the solution of intermediate problems in the course of the operation (combat). In the Navy, the correlation of forces and means is considered within the limits of an established region of the ocean (sea) of the theater of Military Operations as a whole, and also for the solution of separate missions. On the basis of the established correlation of forces and means, calculations are carried out on the quantity of forces and means necessary on the main and other axes for the fulfillment of the mission posed; the combat composition and groupings of troops (forces) are defined more precisely and also their modes of action; the envisioned *maneuver* has the objective of establishing a favorable correlation of forces and means in the course of an operation (combat).

During World War II, depending upon the command level, a correlation of forces and means was determined in: personnel; quantity of large units (divisions, brigades, battalions), tanks and self-propelled [assault] guns, cannons and mortars (usually by caliber), antitank means, and aircraft. Account was also taken of provision of the sides with ammunition and fuel. The initial data for the calculation was the *combat and numerical strength* of the grouping of our troops, which were drawn up to fulfill the combat mission, and the opposing grouping of enemy troops. Such a method of calculating the correlation of forces and means is suitable even for contemporary conditions especially if comparing approximately identical, according to *combat capabilities [boyevaya vozmozhnost']*, troop formations, armament, military materiel. In this connection for tactical calculations,

the unit usually taken is a battalion, a company of special troops, a squadron, or a ship; for operational (strategic) calculations, it is a division, an independent brigade, or a regiment of a type of armed forces (branch of troops). At all levels of command one compares quantities of personnel strength, rocket launchers, nuclear weapons, tanks, guns and mortars, aircraft, ships, and others. In those cases when the combat capabilities essentially differ, use is made of coefficients of comparability [koeffitsienty sopostavimosti] of combat potential [boyevykh potentsialov] calculated in advance. If, for example, we take as a unit of combat capability the 122mm howitzer (battery, battalion), or a motorized rifle battalion for inflicting casualties on the enemy, comparing with them the combat capabilities of other subunits of our troops and the enemy, then it is possible to obtain coefficients of comparability of combat potential, use of which makes it possible to rate and to compare the combat capabilities of any grouping of troops of the sides. For a more objective determination of the correlation of forces and means, the following are taken into account: the peculiarities of organization of the troops (forces) of the sides, their levels of combat training, their national composition of the troops and their moral-fighting qualities, capabilities of forces and means for reconnaissance, tactical-technical data on armament and military materiel, experience conducting combat operations, stability of troop control (forces), materiel-technical provision, the nature of the terrain and its engineering preparation and others. Those factors when lend themselves to mathematical expression are compared with the aid of one or another coefficients, while the rest are determined in terms of "better" or worse." At present computer equipment is used for speeding up computation of the correlation of forces and means. Possible changes in the correlation of forces and means in the course of combat actions can be determined with the aid of *modeling*.

V. I. Belyakov's article in the Soviet Military Encyclopedia, volume 7, page 445, 1976.

The 1983 *Military Encyclopedic Dictionary* added that in making such calculations, use was also made of various handbooks, tables, and computers.

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CAA	THE L'VOV-SANDOMIR OPERATION JULY 13 - AUGUST 29, 1944	STUDY SUMMARY CAA-RP-89-2

THE REASON FOR PERFORMING THE STUDY was to determine the feasibility of obtaining Soviet data for the Benchmark program.

THE STUDY SPONSOR was the Director, US Army Concepts Analysis Agency.

THE STUDY OBJECTIVES were to:

(1) Demonstrate that the Soviet quantitative data available for historical combat operations are extensive.

(2) Provide a concrete example of Soviet troop control and operational art which involved extensive massing of troops at multiple organization levels.

(3) Provide an example of an operational situation which would today call for the Soviet staff to do planning calculations using an automated troop control system.

THE SCOPE OF THE STUDY was limited to whatever could be found in about a calendar month and roughly 2 weeks of effort. The literature search was limited to sources onhand.

THE MAIN ASSUMPTION on which the study is based is that Soviet historical combat data have been collected competently and are honestly reported in Soviet open source literature.

THE PRINCIPAL LIMITATIONS which may affect further research are:

(1) Incomplete Soviet casualty and equipment loss data.

(2) The available casualty data are not always clear as to what definitions are used.

(3) Limited data on logistic support have been identified thus far.

(4) Data are available mainly about initial strengths and almost nothing on intermediate values, much less final strengths.

(5) Arrival time and extent of reinforcements are not always clear.

THE PRINCIPAL FINDING of the work reported was that, other than combat casualty data which are limited, Soviet data are comparable in extent to US data, it may be easier to extract (the Soviets having done most of the work), and quantitative historical data appear to be used consistently in Soviet sources over many years.

THE STUDY EFFORT was done by Dr. Allan S. Rehm, Distinguished Visiting Analyst.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-MV, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.